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$$+ \frac{df}{dx}x + \frac{df}{dy}y + \dots + \frac{df}{dw}w, \quad (25')$$

which is of the form (25) and we have

$$r_u^2 = \left\{ \frac{df^2}{dx^2} \left[\frac{\alpha^2}{p} \right] + \frac{df}{dx} \cdot \frac{df}{dy} \left[\frac{\alpha\beta}{p} \right] + \dots + \frac{df}{dx} \cdot \frac{df}{dw} \left[\frac{\alpha\lambda}{p} \right] \right. \\ + \frac{df}{dx} \cdot \frac{df}{dy} \left[\frac{\alpha\beta}{p} \right] + \frac{df^2}{dy^2} \left[\frac{\beta^2}{p} \right] + \dots + \frac{df}{dy} \cdot \frac{df}{dw} \left[\frac{\beta\lambda}{p} \right] \\ + \frac{df}{dx} \cdot \frac{df}{dw} \left[\frac{\alpha\lambda}{p} \right] + \frac{df}{dy} \cdot \frac{df}{dw} \left[\frac{\beta\lambda}{p} \right] + \dots + \frac{df^2}{dw^2} \left[\frac{\lambda^2}{p} \right] \left. \right\} r^2. \quad (26')$$

CONTINUATION OF THE NOTE AT P. 57 BY THE EDITOR.—Substituting for α its value $\frac{\omega^2 m R}{5F} + 1$, also substituting for F its value, $m \frac{v^2}{D}$, from (3), and writing h for $\omega^2 \div v^2$, we have

$$\theta = \frac{R}{r} \varphi - \frac{R}{r} \sqrt{\left(\frac{RDh}{5} \right)} \int \frac{d\varphi}{\sqrt{\left(\frac{1}{5} RDh + 1 - \cos\varphi \right)}},$$

or, substituting for $\cos\varphi$ its equivalent, $1 - 2 \sin^2 \frac{1}{2}\varphi$, dividing the quantity under the second radical by $\frac{1}{5} RDh$, placing this divisor in the denominator of the first radical and writing ψ for $\frac{1}{2}\varphi$ and c^2 for $10 \div RDh$, we get

$$\theta = \frac{R}{r} \varphi - \frac{R}{r} \int \frac{2d\psi}{\sqrt{1 + c^2 \sin^2 \psi}}.$$

From (3) we have

$$\theta = \frac{R}{r} \varphi - \frac{R}{r} \omega t, \\ \therefore t = \frac{2}{\omega} \int \frac{d\psi}{\sqrt{1 + c^2 \sin^2 \psi}}. \quad (8)$$

Substituting for $\sin^2 \psi$ its equivalent $1 - \cos^2 \psi$, dividing the quantity under the radical by $1 + c^2$, and writing e^2 for $c^2 \div (1 + c^2)$ we have

$$t = \frac{2}{\omega \sqrt{1 + c^2}} \int \frac{d\psi}{\sqrt{1 - e^2 \cos^2 \psi}}. \quad (9)$$

The foregoing was sent to Mr. Charles H. Kummell, of the U. S. Lake Survey, with the request that he should calculate the numerical value of t ; and, in response, Mr. Kummell has put the integral in the form

$$t = \int_{\frac{1}{2}\pi - \phi}^{\frac{\pi}{2}} \frac{d\Psi}{\sqrt{a^2 \cos^2 \Psi + b^2 \sin^2 \Psi}} \quad (10)$$

which is more convenient for numerical calculation, and from which he finds

$$t_u = 9^h 05^m 38^s.4.$$

Hence it appears that the ball will pass a point 180° from the initial point, $2^h 54^m 21^s.6$ before the point A will pass the same point in space.